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UNIT COST STUDIES.

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THE LITERATURE ON UNIT COST STUDIES IS REVIEWED, AND A UNIT COST STUDY IS MADE ON THE WISCONSIN STATE UNIVERSITIES. UNIT COST STUDIES ARE USEFUL IN FOUR WAYS--(1) THEY PROVIDE INFORMATION WHICH CAN BE RELATED TO THE GOALS OF EDUCATION IN MAJOR POLICY FORMATION, (2) THEY PROVIDE A BASIS FOR THE EVALUATION OF EFFICIENCY AT DIFFERENT LEVELS, (3) THEY PROVIDE DATA USEFUL TO A STUDY OF ALTERNATIVES, AND (4) THEY ARE USED IN PROGRAM PLANNING AND BUDGET PREPARATION. A BIBLIOGRAPHY OF RELEVANT LITERATURE IS PROVIDED. (HW)

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UNIT COST STUDIES

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UNIT COST STUDIES IN HIGHER EDUCATION

I. Definition.

Unit costs in higher education are the generalized, quantifiable value of the resources invested and expended, divided by a standard identifiable measure of output such as a contact period, credit, major program, curriculum, or student. Units are based on registrars' records. Costs are based on budgets and financial accounting records.

II. Why Study Unit Costs?

The need for unit cost studies of higher education today is as great as ever. Across the land, well-meaning legislators, governoring boards, and educators are establishing small junior colleges, community colleges, branch campuses, and "university centers" in the firm conviction that such action will (1) increase the percentage of high school graduates going on for higher education; (2) reduce the costs of providing higher education for the masses; (3) improve the quality of education; and (4) prove an economic boon to the communities in which they are located. All of these points are occassionally disputed; however, the last is less often challenged than are the others. In actual fact, local pride is the prime mover. Fenske and Little indicate that, at least in Wisconsin, the first point is probably not valid; i.e., the presence of institutions of higher education does not effect the number of high school graduates going on for higher education.*28

Aldo D. Henderson, who should certainly know better, argues for the decentralization of higher education, on economic grounds.*38 Henderson reasons that in decentralizing higher education ". . . a better economy in the distribution of the costs for facilities is secured through having local and regional participation". However, facility costs do not rise nor decline on the basis of where the money comes from!

In a recent article he claims "There is a further relief in that the burden of financing can be well distributed among the students and the local and state governments". It is true that while the total burden (cost per student) is usually increased by building sattelite campuses, the cost to students commuting less than twenty miles is reduced. But it is also true that the burden on state government goes up substantially and the burden on local government is infinitely higher for decentralized institutions of the Wisconsin variety than for fully state-supported universities. Local government, dependent on regressive property taxes, is not the logical choice to

bear the burdens of higher education.*99 If Algo D. Henderson, director, Center for the Study of Higher Education, University of Michigan, is really as confused as he seems to be, one cannot really be surprised at the generally held convictions of other educators, board members, and legislators. Unit cost studies, and the wide dissemination of the results, are clearly in order.

If the general ignorance of policy makers is not sufficient reason for continuing study of the unit costs of higher education, the many wastes and inefficiencies in higher education are. "With current costs (for all institutionalized education in the U.S.) about $35 billion, it is important that education achieve its objectives at minimum costs. Even if we cannot measure productivity, we know we can increase it by reducing wastes ...".*36 Whenever we pay $1.00 to accomplish an 80¢ result, we reduce productivity. When we only invest 80¢ even though a $1.00 investment would produce a result worth more than 25% more, we also err. "The one truly effective way to cut costs is to cut out an activity altogether".*24 In higher education Tickton has shown quite effectively that the key to reducing costs is the elimination of small units, small classes, as well as small institutions.*89 At the same time, "Results are obtained by exploiting opportunities, not by solving problems" as the philosopher-king of management tells us*24 In any case, unit cost data is essential for sound management.

A third reason for studying the unit costs of higher education is to accumulate information which can be used in making allocations to and within education. "The fact is that crucial decisions on such matters as how much to spend on education, and on what programs, are not made in any rational manner".*36 Although much of this irrationality can be blamed on excessive political influences and poor organization for planning and administration, some of it is due to inadequate data. One of the crucial factors in the formula for making decisions concerning resource allocations for manpower development is the unit cost of programs. "... unit costs furnish a basis upon which to project workload requirements and provide some basis for identifying the necessary different levels of support. This data, combined with desirable standards for quality, can help in the process of developing an understandable, objective budget procedure in which budget decisions are related to clearly defined goals".*96 Knowledge concerning the effects of and value of alternative investments is necessary, but it is useless unless one also knows the relative costs of alternatives. Too often funds are pushed in one direction or another on the basis of general hunches and a touch of hope, even though better data can be generated. We must generate data on the return on investment in education against that of alternative investments and on the costs and values involved in reallocating among the programs, subprograms, and activities which comprise our institutionalized educational enterprise.*36

The politics of budgeting for higher education operate under two almost sacred constraints: (1) the idea that no department or activity

should be cut below its existing level of support; and (2) the idea of equity; i.e., that every department should get a fair share of any increase in funds.*93 As a psychological device to make people in administration think*71 about these and other issues, program and performance budgeting techniques are being introduced.*74 These techniques developed initially in municipal and later in federal government,*14 imply the use of unit cost data.*29

Conceptualized, organized, and built to meet specific institutional goals, the program budget deals with the classical budget question ("On what basis shall it be decided to allocate X dollars to Activity A instead of allocating them to Activity B, or instead of allowing the taxpayer to use the money for his individual purposes?")*54 through the use of formulas and cost benefit analysis. Formulas are designed to form the basis for estimates of future budgetary requirements through the use of predetermined program cost relationships coupled with estimates of future levels of program activity.*61 Cost relationships are derived from unit costs which result from cost studies and analysis. At Indiana University, for example, sophisticated cost analysis is carried out for instruction, central services, physical plant operations, and a variety of other activities.*43 Past, present, and future unit costs are combined to estimate the real cost of adding a program and alternate programs. The university president and other decision makers can then see the estimated costs of teaching, research, and community service programs in terms of alternates as well as in terms of time. By comparing and choosing wisely the costs of achieving the desired results are minimized or, putting it another way, investment of resources is optimized.*94

In summary we can say that unit cost studies:

(1) provide information which can be related to the goals of education in major policy formation;

(2) provide a basis for the evaluation of efficiency at different levels;

(3) provide data useful to a study of alternatives;*79

(4) are used in program planning and in the preparation of budgets.

III. Registrar's Records: The Basic Units.

In the colonial colleges curricula leading to specific degrees consisted of year-long courses of study prescribed for each class. During the latter half of the nineteenth century the introduction of the elective system resulted in curricular or degree requirements which could be satisfied in a variety of ways. Emphasis in record keeping shifted to courses, and in 1870-71, courses were listed, in the Harvard catalogue, according to department rather than according to class. By 1881 year

courses had been divided into half-courses or semesters.*12 In 1885 President David Starr Jordan required upper classmen at Indiana University to choose a major study. Within the next twenty years the development and recognition of major and minor programs of study spread to many other colleges and universities.*20 A major program of study today generally consists of 30 or more semester credits (or 45 or more quarter credits) earned from among a group of prescribed courses. A minor program consists of from 15 to 22 semester credits (or its equivalent in quarter credits) and is usually less limited than the major, and is frequently little more than 15 credits in any of the courses offered by a single department.

Although Horace Mann was able to collect hundreds of different forms of records in 1837 as he sought to establish a uniform educational record system for the state of Massachusetts, the typical college record of that era consisted of a ledger in which entry was made of the names of students admitted, successive columns being devoted to their progress in classes, marks of distinction conferred, and finally a notation relative to departure, dismissal, or graduation.*53 The work of the Committee on College Entrance Requirements of the National Education Association, in 1899, led to the establishment, in 1900,of the College Entrance Examination Board which, in turn, provided uniform definitions of subjects and stimulated, by 1909, the adoption of Carnegie units as standards of achievement and progress.*69 By 1920, as a result of the organization and action of regional accrediting agencies, not only secondary school, but college and university record systems as well had become standardized nation wide.*46

The academic year traditional consists of 36 weeks, divided into either two semesters of 18 weeks each or three quarters of 12 weeks each. The semester (quarter) credit represents one period (hour) of class (lecture or discussion) per week for one semester(quarter). Two hours of supervised laboratory work are usually considered the equivalent of one hour of lecture or discussion. Standard graduation requirements are 120 semester credits or 180 quarter credits. Summer sessions are often 8 weeks long and equal 4/9's of a semester (or 3/4's of a quarter).*110 Today the most carefully detailed inquiry of registrars as to the origin and purpose of the college and university record system will elicit responses which can be summarized: "It is what it is and was ever thus!".

Despite the inflexibleness and insensitivity of most registrars, the definition and redefinition of academic units of measurement continues. Among the most recent, two are particularly useful and are most liable to become permanent universals: "student registrations" and "contact periods".*88

One "student registration" is one enrollment by a student in one section or in one course division. "Student registration", it can be noted, is merely a refinement or subdivision of "student course", which is an

enrollment of a student in a course. A "contact period" is a standard length of time (which varies from institution to institution but most often equals 50 minutes) during which an instructor and one or more students are "face to face" for some educational purpose. "Contact period" has been carefully defined so as to subsume such inexact terms as "contact hour", "class hour", "clock hour", etc. while leaving "hour" with its traditional meaning; i.e., 60 minutes. Lest anyone should assume that agreement to refine inexact terms is easy, in "educated" circles, it should be noted that the term "clock hour" has been in use at least since 1916![*90]

IV. Financial Accounting in Higher Education.

Financial records and reports constitute the medium by which information contained in the accounts and needed for administrative guidance and action is made available. In his classic work, The Financing of Higher Education,[*78] John Dale Russell traces the history of efforts to establish a system of classifying data on the income and expenditures of colleges and universities. He identifies the major land marks as (1) the Carnegie Report of 1910;[*15] (2) the report of Christensen's committee in 1917;[*17] (3) Arnett's work of 1922;[*5] (4) the 1935 report of the National Committee on Standard Reports;[*66] and (5) the 1952-55 revision of the 1935 report.[*67]

As indicated above, the first important step toward uniformity in financial record keeping and reporting in colleges and universities was a Carnegie Foundation bulletin published in 1910. Use of the accounting system implied by the Carnegie forms became a sometimes explicit, sometimes implicit qualifying condition for consideration for Carnegie Foundation grants. Inasmuch as almost every institution of higher education sought such grants, a "national" accounting system for colleges and universities was established in short order.

The second major step in financial accounting in higher education was the organization, in the Midwest, of the first association of college and university business officers in 1912. In 1917, Christensen presented, to that group, the findings of a committee of college and university business officers recommending a standard classification of receipts and expenditures, which was generally compatible with the forms and common practice of municipal government accounting.

Arnett, in making the first major independent contribution to the literature, in 1922, emphasized the desirability of separating current, endowment, and plant funds. Arnett, a reflective thinker and innovator, gained wide recognition, and reigned as the authority on financial accounting in higher education until the advent of Russell and Blackwell.

Lindsay and Holland prepared a monumental 666 page tome on College and University Administration in 1930.[*55] They make the widely accepted point that accounting builds an audit trail for the legal review of

fiscal procedures and expenditures and also provides information on which to base decisions. They go on to suggest that some of the other elements to be used with accounting data in the decision-making process are teaching loads, class size, floor space, and various comparisons with previous periods.

In 1935 the National Committee on Standard Reports added loan funds and agency (or auxiliary) funds to Arnett's major fund list. It further recommended that current educational and general expenditures be classified as:

1. Administration and general institutional expense;
2. Instruction;
3. Organized research;
4. Extension;
5. Library
6. Physical plant operations and maintenance;
7. Other organized activities relating to instruction.

In 1938 another national committee was appointed by the American Council on Education to prepare a modern, authoritative text on college and university business administration. This National Committee identified four major categories of activity which, it recommended, should be separated from other institutional operations: auxiliary enterprises, student financial aids, hospitals, and contract research. In other respects their report finally published in two volumes in 1952 and 1955 reflects and supports the principles first enunciated by Arnett and subsequently amplified by the National Committee on Standard Reports of 1935.

College and University Business Administration, Volumes I and II, remain the standard work; however, research involving intensive inter-institutional analysis requires more finely divided classifications and categories. For example, in 1954 the National Federation of College and University Business Officers Associations*68 found it advisable to subdivide the major categories previously recommended. In 1955, Russell and Doi*76 in making an intensive analysis of educational and general expenditures for a group of state supported institutions, also found it necessary to deviate from the pattern of classification recommended in the 1952-1955 reports in order to make valid comparisons of costs among the institutions. Clearly, these studies, done by men who had taken part in the preparation of the 1952-1955 reports, showed that major revisions in definitions and a greater degree of uniformity in data collection and organization were needed if large numbers of colleges and universities were to be intensively analyzed and compared. A National Committee for the revision of Volumes I and II College and University Business Administration is presently at work.

In the meantime, the Association of Governing Boards of Universities and Colleges, the State Universities Association, the Association of

State Universities and Land-Grant Colleges, and the United States Office of Education united to sponsor Cooperative Research Project No. 1853 which resulted in the 1966 publication of Financial Analysis of Current Operations of Colleges and Universities under the authorship of Swanson, Arden, and Still*88. This publication is a manual which combines accounting and institutional study practices and techniques. Unit cost studies in higher education will undoubtedly be based on this manual for many years to come.

Swanson, Arden and Still apply the concept of an institution of higher education as basically an environment for learning as previously done in the California and Western Conference Cost and Statistical Study.*31 In accounting they follow the broad classifications recommended in College and University Business Administration but carry the functional principle to the very lowest level, ignoring any non-functional organization patterns. Income is treated in three categories:

1. Fees and charges to individuals or organizations purchasing services directly (students, research contractors, dormitory renters, food service customers, etc.).

2. Specific subsidies (restricted endowments, scholarships, restricted gifts, etc.)

3. General subsidies (state appropriations, unrestricted gifts, unrestricted endowments, etc.)

Finally, for purposes of financial analysis, Swanson, Arden, and Still classify expenditures according to the following five functions:

1. Instruction
   a. Organized teaching
   b. Academic counseling
   c. Operation of special instructional facilities: Speech Clinic, Demonstration School, Demonstration Farm, Reading Clinic, etc.
   d. Admissions
   e. Registration

2. Research
   a. Projects
   b. Faculty development
   c. Operation of special research facilities: Research Farm, Nuclear Reactor, ect.

3. Public service
   a. Extension courses (non-credit)
   b. Other means of disseminating knowledge: Television, Consulting, Agricultural Extension, University Press, etc.
   c. Regulation and Inspection

4. Services to the Academic Community
   a. Student development: Counseling and Testing Centers, Religious Centers, Vocational Guidance, Placement, etc.
   b. Student Financial Aids: Employment, Scholarships, Grants, Loans, etc.
   c. Care, Subsistence, and Recreation: Housing, Food Service, Union, Health Service, Bookstores, Parking, Athletics, Student Organizations and Activities, Cultural Activities, etc.

5. General support
   a. Learning resources: Library, museum, audio-visual aids, language labs, etc.
   b. Physical plant operation & maintenance: Care and cleaning of grounds, maintenance of buildings, care and cleaning of buildings, protection, transportation, etc.
   c. Administration: Governing board, university administration, institutional studies, campus planning, etc.
   d. Promotion and Development: Alumni affairs, student recruitment, public relations, etc.
   e. General Institutional expense: Institutional memberships, communications, insurance, interest, entertainment, etc.

V. Unit Cost Studies: The Literature.

A. The Approach.

Cost accounting is that method of accounting which provides for the assembling and recording of all the elements of cost incurred to accomplish a particular purpose. Cost accounting facilitates cost analysis which is useful in (a) relating cost to value, and (b) reducing cost relative to value.*64

Costs in education are dependent on many variables, such as the level of compensation afforded the faculty, the number of students per section, the number of class periods per day, the mix of laboratory, lecture, and discussion sections, etc. Costs cover such things as personal services, capital outlay, debt service, supplies, etc. Unit costs, as pointed out earlier, are total costs divided by the quantity of units of output.

B. Early Studies.

Sherer noted that unit instructional costs in education were being computed as early as 1894.*83 Ever since Strayer's*87 study of city school expenditures and Elliot's study of comparative educational costs, both published in 1905, the unit costs of education have been studied continuously.*27

C. Units.

In 1914 the famous, or infamous, Allen survey investigated expenditures at the University of Wisconsin and expressed the results in terms of costs per full-time student.*2 In a survey of educational institutions in the state of Washington in 1916 costs of instruction in various disciplines were presented in terms of student clock hour units.*90

Anticipating Parkinson*70 by a number of years, and unwittingly providing documentary support for the thesis that functionaries in the public sphere are less interested in results than in perpetuating their own activities, Hungate divides instructional expenditures by the number of full-time faculty thus making cost per "institutional professional" the basic unit. In what seems to be a dawning realization of the philosophic implications of such a concept he later acknowledges that cost per student graduated may be a more desirable unit.*44 Some recent cost studies are very detailed and attempt to measure very small units. In November, 1966 for example, the American Chemical Society reported the operating cost of providing laboratory chemistry instruction for freshmen at 75¢ an hour.*1

D. Standardization.

Stevens and Elliott made a number of interesting cost studies in 1925 but found that differences in institutional accounting systems hampered their efforts. They suggested adoption of common accounting systems which would "permit the claims of higher education to be presented to the public in terms of service".*85

The same "National Committee . . ." which promoted uniform financial reports in 1935 made a comprehensive review of extant unit cost studies and concluded that there was a need for a "recognized technique for the computation of unit costs if these costs are to have any value outside the individual institutions in which they are calculated". To that end it presented, in outline form, two plans: (1) Divide total "educational and general" expenditures by total full-time equivalent enrollment; (2) Distribute administration, library, and physical plant costs to instruction, research, extension, and auxiliary enterprises, proportionately, then divide the resulting totals by the full-time equivalent enrollment. This committee also encouraged the calculation of unit costs by department or discipline; i.e., English, geography, civil engineering, etc., and by level of instruction; i.e., lower division (freshman and sophomore), upper division (junior and senior), graduate division, etc.*65

E. Economies of Scale.

McNeely applied the National Committee's methods in a study of nine universities, computed the costs of a number of complete curricula,*59 and found great variation from institution to institution. In that same year, Kilzer made a study of 78 junior colleges which presumably had the same mission and found costs in some institutions running as high as six times those in others. Needless to say, variations of this magnitude raise serious questions as to efficiency and quality.*49

The principle that there are economies related to increases in the scale of activities is widely accepted, though less widely applied, in higher education.*25 The 1958 survey of higher education in Michigan indicates that larger universities have lower unit costs than smaller universities.*77 The proposition that the "economies of

scale" principle is applicable to education is further borne out by the studies of Hanson*35 which indicate that generally the larger the school the lower the unit costs. Hanson suggests that there may be a point of diseconomy of scale in the 20,000 to 50,000 student level, though the evidence is inconclusive. Doi and Russell partially explain the "economies of scale" principle by pointing out that institutions with small enrollments generally have to expend more per student for administration and for libraries than large institutions, to maintain comparable quality.*21

F. Economies of Age.
There is also some evidence that an "economies of age" principle exists. Elmore states that "If the operation has been performed previously, expected savings should be evident in subsequent performances".*25 The California and Western Conference Cost . . . study hypothesized that ". . .physical plant expenditures tend to be greater than average both for very new and for very old buildings".*60 Managers in private business are commonly expected to increase efficiency by one to three percent per year irrespective of changes in scale. Whether this principle can be applied in higher education is questionable.

G. Cost, Quality, and the Economy.
Undoubtedly the biggest factor in explaining differences in unit costs between institutions is quality. By the mid-thirties accounting practices had become sufficiently standardized to permit inter-institutional unit cost studies in connection with accreditation. Reeves and Russell developed a manual, based on their wide experience in this field, in which they carefully advised that the relationships between cost and quality are inexact and must be tempered with judgment. They also pointed out the need for correcting cost data to account for variations in the size of enrollment (and scope of program) before <u>using cost as an indicator of quality in making inter-institutional comparisons</u>.*72

Interest in the relationship between cost and quality in education was greatly stimulated in 1925 by Bagley's report that a correlation of .92 existed between his index of quality based on five units of expenditure for education in 1880 and the number of graduates listed in <u>Who's Who</u> in 1924.*6 Bowyer analyzed the relationship between investment in education and the economic development of the states and found that high investment (expenditure) was followed by positive economic development within ten to twelve years.*11

In 1949 Wollatt completed a cost study which indicated not only that the more money spent, the higher the quality of education, but also that investment in education had not yet reached the point of diminishing returns.*109 Bloom's study in 1955 generally corroborated these conclusions.*9 In 1956, Furno found a correlation of .60 between the level of expenditure per unit and the quality of the educational

program at the public elementary and secondary school level. He also noted a lag between cause (expenditure) and effect (quality of program).*32 However, a Connecticut study in 1957 found little relationship between expenditure level and student achievement on standard exams.*19 This sort of inconsistency, which seems to tell us more about the researchers than about cost-quality relationships in education, led Knezevich and DeKoch to call for the elimination of value-judgments and "quantity equals quality" fixations from educational research!*52

The most recent research, by Loveless, indicates a high positive correlation (.66 to .83) between expenditure per student in the period 1926-1930 and income per individual in 1951-1955.*56 Other research, by Moody, indicates that within the period 1945-1957 there was no correlation between investment in education and economic growth; that is, taxation for education, though higher than ever before, was not so high as to have any appreciable, immediate dampening effect on the general economy.*63 Although much of this research concerns elementary and secondary education, there are implications for higher education in these summary statements:

(1) Quality at any given time is more likely to be related to expenditures over a period of time than to expenditures at that given time;

(2) A positive relationship between quality and past expenditure levels will exist when resources are budgeted and expended wisely;

(3) Quality depends on wise expenditure in combination with other essential factors and conditions;

(4) These other conditions may induce high quality at relatively low expenditure levels when personnel can be recruited, retained, and stimulated to do good work without high monetary rewards.*13 & *72

H. Reducing Unit Costs.

Unit cost studies have not been limited to the general cost per student approach. In 1931 Magee, to no one's surprise, documented the low cost of freshman courses and the increasingly higher costs of sophomore, junior, senior, and graduate courses. He also used the credit hour as the basic unit for measuring the costs of curricula, academic departments, and different levels of instruction. Within institutions of comparable size he found that average costs increase as the number of curricula increase.*57 Ruml and Morrison extensively expanded on this principle in their widely read Memo to a College Trustee.*75 Proposals to limit curricular offerings in adjacent state institutions, to make them complimentary rather than duplicative, are based on the same principle.

Application of the "Ruml plan" and other "efficiency promoting" techniques does not go unchallenged. Note the following comments by an accrediting team visiting Parsons College: "Factory Accounting Methods. Too much concern is given to so-called cost accounting evaluations. . . This attempt to provide factory accounting methods to an educational institution has not been successful. . .".*18

Ikenberry maintains that reducing costs per student does not necessarily decrease instructional quality.*45 And Dressel goes so far as to assert that decreases in educational costs can be associated with improved education where course proliferation is arrested.*23 Eckert, reviewing the pertinent research, concludes that there are "... few significant differences in achievement between students taught in different-sized groups. . .".*26 The cozy, costly class of 25 must henceforth be supported on other grounds.

The California and Western Conference Cost . . . study concludes that "Teaching salaries do not appear to be related to cost per student . . . because other factors are of greater weight. Thus, it is possible to raise academic salaries and reduce unit costs at the same time".*60 The well-documented quality-cost relationships apparently are only general in nature. Intervening factors are breadth of curriculum and level of instruction; i.e., student mix, which affect class-section size, teaching load, and method of instruction. At least one of these factors, size of class, has little or no effect on quality.

I. Costs, By Level.
Williams' report on unit costs, by level, at Michigan, generally corroborates the conclusions reached by Magee and the many others who have worked in this field. Although the mean cost ratios are 1:2:6 among freshmen:juniors:graduates, there are wide variations from discipline to discipline. English department costs are actually higher at the lower division (freshman-sophomore) level than at the upper division (junior-senior) level, and costs in engineering and music are almost the same on both levels.*95

J. Costs vs. Fees.
Two of the criteria applied by Reeves and Russell, in the financial approach to measuring institutional quality, were (1) expenditure per student for instructional purposes, and (2) percentage of instructional expenditures paid for by income from student fees.*72 Although fees in Wisconsin's public institutions of higher education approach 25% of instructional costs, fee proposals range from zero to 100%. The former is a cornerstone of the national Phi Delta Kappa fraternity for men in education; the latter was presented to a wide, influential audience in a 1957 Fortune magazine article, "Colleges are Too Cheap!" by Herbert Solow. Solow proposed softening the impact by granting loans to cover fees. He also supported Ernest Van den Haeg's self-controlling loan program under which colleges would "have an incentive to select for investment (i.e., granting of leans) just about as many students as

will be able to repay--no more, no less. Selecting more would be risking loss of the investment. Selecting less would mean loss of investment opportunity . . .".*84

K. Recent Trends.

Millett's monumental study on Financing Higher Education in the United States reveals that though instructional dollars expended per student increased between 1930 and 1950 in accredited institutions of higher education, purchasing power per student had actually decreased because of a decline in the value of the dollar. Millett is inclined to see this reduction in support per student as the result of increasing efficiency rather than declining quality. Alas, the "increase in efficiency" seems to be due almost solely to increasing class size rather than to improved technology.*62

Balderson recently claimed that "The unit costs of higher education have increased more rapidly than costs in other parts of the economy (during the past ten years)".*7 And in 1963 Chambers asserted that operating expenses of universities and colleges rise faster than the number of students enrolled and that within ten years enrollments will double while the operating cost per student will go up 50%.*16 The Digest of Educational Statistics seems to support Chambers and makes the further point that in the period 1955-1965 higher education expenditures tripled, while all school expenditures doubled. It may be of some comfort to the taxpayers to note that the U. S. Office of Education projects only a 66% increase in spending for education during the next ten years. The relevant cost per student figures are:

1955	$1815	
1965	$2442	up 35%
1975	$2976	up 22%

Physical plant value per student seems to be increasing at the rate of 1.77% per year.*92

Bokelman and D'Amico point out that while overall costs per student continue to rise, para-institutional programs such as research and public service rise much faster than direct instructional costs. They claim that while para-instructional costs accounted for only 17.2% of college and university budgets in 1931-32, by 1960-61 that figure had changed to 31.8%.*10

In any case, the American Council on Education can be eloquent on the subject of higher education costs: ". . . while the price of higher education is high and going higher, this cost is far less costly to the American people than settling for'the wasteful ineffectiveness of educational mediocrity'. . . So important is the end in view, both to the individual and to our free society, that true economy dictates the choice of the most effective rather than the least expensive means".*3

L. Recent Studies.

In 1953 Kettler*47 asked, "What's wrong with the unit cost idea?", answered, "Nothing!", and suggested that post-World War II studies were long overdue. Whether by coincidence or by design, three major studies were completed within the next three years. In 1956 Knott

reported the results of a cost study conducted by the National League for Nursing and the U. S. Public Health Service. This stimulated institutions then offering nursing training to examine their costs and subsequently has led many to abandon the field. If hospitals continue the trend away from nursing education, the eventual results may be revolutionary! I know of no other cost study in higher education which has had such broad and dramatic effects!*50

The "Sixty College Study", was financed by the (Ford) Fund for the Advancement of Education, and conducted in sixty liberal arts colleges in various sections of the United States by the National Federation of College and University Business Officers in 1954. It is notable on two points: (1) It overcame problems related to dissimilarities in accounting records by using a standard worksheet on which accounts were grouped for pruposes of the study on the basis of the considered judgment of the business officers making the study. (2) The study skirted the cost-benefit issue and its concomitant problems by presenting the data in terms of the percentage of expenditures devoted to various functions, i.e., administration, public service, instruction, research, libraries, etc.*30

The most widely read and most widely quoted unit cost study to date is the California and Western Conference Cost and Statistical Study for the Year 1954-55, sometimes called the Council of Ten study.*60 Under the able leadership of William T. Middlebrook of the University of Minnesota, this study group boldly published the results of its inquiry and the implications for policy change. In addition to the items cited elsewhere, this study made the following additions to the literature:

(1) Unit costs change as the "student mix" changes;
(2) Unit costs are lowest where the number of curricula are lowest;
(3) Significant variation in unit costs exists among institutions within given academic disciplines.
(4) Cost functions are curvilinear rather than linear; i.e., because of the changing mix of fixed, semi-fixed, and variable costs, changes in unit costs form an irregular curve pattern. In some cases decreases in enrollment do not decrease total cost.

The California and Western Conference*60 study also performed the disservice of disseminating and popularizing the misconception that ". . . the product of a college or university is an environment for learning . . ." (italics added). The end product of colleges and universities is educated students; the environment is clearly the means not the end. Unfortunately, the error persists in the most recent document, and, considering the weight of the establishment which habitually thinks that way, will not be easily dislodged.*88

On this point Hirschl, interestingly, sees the "environment for learning" as the "nature of a university" and "intellectual growth" as the product. Hirschl also suggests that accrual rather than cash accounting should be applied in determining which costs to assign to any period under study.*42

The California and Western Confefence Study concludes by asking what has long been considered the unanswerable question: "How can the effectiveness of different environments for learning (institutions of higher education) be measured and compared?". Colleges and universities are being measured and compared every day:

(1) By students deciding where to enroll;
(2) By legislative bodies, philanthropists, and others deciding where to "invest" their funds;
(3) By graduate schools deciding which and how many students to admit;
and (4) By employers deciding which graduates to employ and how much to pay them.

It may be unfortunate that the judgments of the students, financing institutions, and employers vary so frequently and so greatly from the judgments of the educational administrators and faculty, but that is no reason to pretend that measurements and comparisons are not being made. Rather the variation in evaluation is an invitation to further study!

VI. Unit Cost Studies: Research.

Although shorter periods are sometimes used, the overwhelming practice in higher education is to develop unit costs at the conclusion of relatively long periods of activity; for example, a semester or year, and to assign all budgeted or actual expenditures to standard categories. The costs of any given unit are derived from: (1) a careful study of past experience, including, if possible, objective measurement of parallel programs which result in essentially identical output; (2) examination of the unit in terms of the categories of expenditure necessary to produce it; (3) review of the functional processes which effect the unit.*8 .

Aside from these standard approaches, the literature reveals a number of other interesting propositions which can be tested against data describing the Wisconsin State Universities. In simpler terms, all unit cost research poses two problems: the first is selecting and defining the unit; the second is deciding what should be included in the cost.*60 The (unit cost) answer then is the result of simple division.

A. What is the average budgeted academic year operating cost of instruction per full-time student enrolled in the Wisconsin State Universities in 1966-67?

1. The unit is full-time equivalent student which is defined, in accordance with the A.A.C.R.A.O. handbook.*41 Full-time equivalent students = Graduate full-time equivalent students plus Undergraduate F.T.E. students.

F.T.E. Graduates = $Fg + \frac{PgC}{9}$

Where Fg = Full-time graduate students, i.e., those enrolled for 9 credits or more.

PgC = Total credits for which part time graduate students are enrolled. Part time students are those enrolled for 8 credits or fewer.

F.T.E. Undergraduates = $Fu + \frac{PuC}{12}$

Where Fu = Full time undergraduates, i.e., those enrolled for 12 credits or more,

FuC = Total credits for which part time undergraduates are enrolled. Part time undergraduates are those enrolled for 11 credits or fewer.

Enrollments at the Wisconsin State Universities were as follows in the fall term of 1966-67.*104

SCHEDULE I

University	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Eau Claire	4,676	2,808	234	4,910	27	432	48	75	4,985
La Crosse	4,019	1,908	159	4,178	23	443	49	72	4,250
Stout	3,073	424	35	3,108	67	156	17	84	3,192
Barron County	97	96	8	105	--	---	--	--	105
Oshkosh	7,101	3,515	293	7,394	16	1,117	124	140	7,534
Platteville	3,844	822	69	3,913	26	437	49	75	3,988
River Falls	3.196	1,283	107	3,303	24	343	38	62	3,365
Stevens Point	4,730	1,527	127	4,857	8	298	33	41	4,898
Superior	2,359	949	79	2,438	34	587	65	99	2,537
Whitewater	6,331	2,304	192	6,523	8	765	85	93	6,616
Total	39,426	15,636	1,303	40,729	233	4,578	508	741	41,470

(1) Full-time undergraduate students (12 credits or more).
(2) Credits carried by part-time undergraduates.
(3) Full-time equivalent part-time undergraduates. (2)/12
(4) Total full-time equivalent undergraduates.
(5) Full-time graduates students (9 credits or more).
(6) Credits carried by part-time graduates.
(7) Full-time equivalent part-time graduates. (6)/9
(8) Total full-time equivalent graduates.
(9) Total full-time equivalent students.

2. The operating cost of instruction can be calculated in at least three acceptable ways, but in all three of the following cases excludes:
   : the capital cost of land;
   : the capital cost of buildings;
   : the cost of auxiliary programs;
   : the cost of student financial aids.

a. According to "National Committee . . ." plan one,*65 all costs except those excluded above are included. This avoids the very difficult question of how to allocate administrative, library,

physical plant, and general institutional costs among instruction, research, public service and auxiliary programs. This approach also implies that research and public service are an integral part of, or at least are necessary to, the broad educational mission of a college or university.*60 The Operating Budget for the Wisconsin State Universities 1966-67*103 shows the following:

SCHEDULE II

:Instruction (includes administration, departmental research, extension (public service), library, faculty improvement, etc., but excludes summer session)	$36,424,600
Organized Research	59,100
Physical Plant	4,342,200
Fringe Benefits*106	
:Instruction: Faculty	(27,802,404)
Classified	(3,441,174)
Physical Plant: Classified	(2,437,479)
Subtotal	(33,681,057)
10%	3,368,106
Total Cost (Plan one)	$44,194,006

b. According to "National Committee . . ." plan two,*65 administrative, general, and physical plant costs are prop rtionately distributed to instruction, research, extension (public service), summer session, student (financial aids assistance) and auxiliary programs;: library costs are proportionately distributed to instruction, research, and summer session.

(Greater accuracy could be obtained if these indirect costs were allocated on the basis of specific relationships to direct costs.*33 Swanson et. al.*88 and Hirschl*42 present programs of analysis which provide for such refinement. Unfortunately, such anlyses are not yet available for the Wisconsin State Universities.)

Instruction under plan two then includes departmental research, faculty improvement, etc. and a proportional share of administrative, general, physical plant, and library costs. This plan is premised on the contention that organized project research and extension (public service) are not part of instruction, though departmental research, faculty improvement, and services to the academic community may be, and that administration and general support expenditures serve the entire institution and should not be wholly charged to instruction, which is only one of the major functions of a college or university. The 1966-67 budget*103 shows the following:

SCHEDULE III

			% of Total	% of **	% of *
Instruction	$38,777,600				
Fringe Benefits*106 Faculty	+2,780,240				
Classified	+344,117				
Less Administrative & General	-3,538,956				
Less Fringe Benefits: Faculty	-98,684				
Classified	-129,209				
Less Summer Session	-2,353,000				
Less Fringe Benefits	-235,300				
Less Library	-2,469,090				
Less Fringe Benefits: Faculty	-85,257				
Classified	-46,957				
	NET	$32,945,504	52.08	92.39	92.55
Organized Research	59,100				
Fringe Benefits	3,365	--- 62,465	.10	.18	.18
Extension	146,587				
Fringe Benefits	15,100	--- 161,687	.26	.45	
Summer Session	2,353,000				
Fringe Benefits	235,300	-- 2,588,300	4.09	6.98	7.27
Auxiliary Programs	21,437,819				
Fringe Benefits: Faculty	88,435	21,700,166	34.30		
Classified	173,912				
Student Assistance(Financial Aids)	5,801,350	5,801,350	9.17		
		$63,259,472	100.00	100.00	100.00

* Instruction, Organized Research & Summer Session $35,596,269
** Instruction, Organized Research, Extension & Summer Session $35,658,734

Distributing indirect costs in accordance with "National Committee . . ." plan two results in the following:

Instruction (Academic year) (From Schedule III)	$32,945,504
52.08% of Administration	1,961,775
52.08% of Physical Plant*105 & General (Schedule III)	2,388,362
92.55% of Library (Schedule III)	2,407,507
Total Cost (Plan Two)	$39,703,148
Organized Research	$ 62,465
.10% of Administration & General	3,767
.10% of Physical Plant	4,586
.18% of Library	4,682
Total Cost	$ 75,500
Extension (Public Service)	$ 161,687
.26% of Administration & General	9,794
.26% of Physical Plant	11,923
Total Cost	$ 183,404

Summer Session (Instruction) ----------	$ 2,588,300
4.09% of Administation & General ----------	154,064
4.09% of Physical Plant ----------	187,565
7.27% of Library ----------	189,115
Total Cost ----------	$ 3,119,044
Auxiliary Programs (Enterprises) ----------	$21,700,166
34.30% of Administration & General ----------	1,292,029
34.30% of Physical Plant ----------	1,572,980
Total Cost	$24,565,175
Student (Financial Aids) Assistance ----------	$ 5,801,350
9.17% of Administration & General ----------	345,420
9.17% of Physical Plant ----------	420,532
Total Cost	$ 6,567,302

c. For operating budget planning purposes the State of Wisconsin uses a somewhat different approach than those outlined above. The Wisconsin State Universities budget is divided into five major programs: Instruction, Organized Research, Student (Financial Aids) Assistance, Physical Plant, and Auxiliary Programs.

The program labeled Instruction includes administration, general extension (public service), library and summer session. Summer session, as budgeted, includes only faculty salaries. Fringe benefits were not included in the printed budget prior to 1967-69, but were provided on a sum sufficient basis. In the executive budget for Instruction a fund is identified to provide for increases in workload enrollment.* 58 & 5 To support this part of the budget a cost per student is developed. Students are defined in the standard manner. Costs are the 1966-67 budget for Instruction less summer session, extension, (fringe benefits), and an adjustment for deviations from predicted enrollment. Application of these principles results in a total cost of instruction of $34,422,400 for the 1966-67 academic year.*108

3. Division of the budgeted academic year operating costs of instruction (2 above) by the full-time equivalent enrollment (1 above) results in the following:

SCHEDULE V

a. $44,194,006 divided by 41,470 = $1,066 per student
b. $39,703,148 divided by 41,470 = $ 957 per student
c. $34,422,400 divided by 41,470 = $ 830 per student

B. What is the 1966-67 average cost per student of a college education in the Wisconsin State Universities?

1. The unit is full-time equivalent students (from A-1 above) 41,470.

2. Costs include operating costs of instruction, operating costs of auxiliary programs, the operating costs of the student financial aid program, capital costs of buildings and land, food and housing for

students not covered by the budget for auxiliary services, expenditures for recreation, books, supplies, etc., not covered by the budget for auxiliary services, and income foregone by students. Operating costs for instruction and student financial aid programs have been calculated in A-2-b above. The operating costs of auxiliary programs has also been calculated above; however, gifts and grants for instruction, research, and student aids have been included in the amount of $1,317,520. Distribution of the overhead results in the following:

SCHEDULE VI

	Direct		Overhead (State)		Total	%
Private gifts & grants*105	$ 161,431	+	$ 21,201	=	$ 182,632	.74
Federal support of research*109	231,218	+	30,656	=	261,874	1.07
(Subtotal -- non-instruction)	(392,649)	+	(51,857)	=	(444,506)	(1,81)
Federal support of instruction	924,871	+	122,049	=	1,046,920	4.26
(Subtotal -- non student)	(1,317,520)	+	(173,906)	=	(1,491,426)	(6.07)
Student auxiliary programs	20,382,646	+	2,691,103	=	23,073,749	93.93
Total	$21,700,166	+	$2,865,009	=	$24,565,175	100.00

The portion of the auxiliary budget related to education is $1,046,920 plus $23,073,749 = $24,120,669.

Student financial aids are recorded in three categories: grants (scholarships), loans, and employment. Grants are presumably used by the students to pay expenses such as fees, room, board, etc., which are recorded elsewhere. The interest on loans is a cost to students, for the portion students pay, and a cost to the loaner, for the portion which represents the difference between what the students pay and a fair rate of return. For 1966-67 a federal (NDEA) loan fund of $2,132,063 was available.*103 Repayment does not begin until one year after graduation. The federal government therefore contributes 5% interest on the fund for an average of two and one-half years. It is estimated that half of the loan recipients become teachers and have half the value of their obligation forgiven, i.e., transmuted into a grant. Interest during the ten year loan repayment period is at 3% per year. A fair market return is 5%; the federal government is contributing 90% and the state 10% of the grants to teachers and 2% per year on the balance.* 96

SCHEDULE VII

$2,132,063 times .05 times 2.5 = $266,508 state and federal share.*
Less $2,132,063 times .50 times .50 = -$533,016 state and federal share.*
$2,132,063 - $533,016 = $1,599,047 times .03 times 5 years = $47,971 student share.
$2,132,063 - $533,016 = $1,599,047 times .02 times 5 years = $31,981 state and federal share.*

* State share: 10%; Federal share: 90%.

The State Student Loan Fund will make loans estimated to total $1,242,098 to Wisconsin State University students during academic year 1966-67.* 34 While in school the student pays interest at the rate of 1% per year. A fair return is 5% per year. The State of Wisconsin is contributing 4% per year. After graduation the interest rate becomes 5% per year. The loans are repaid in five years.*96

SCHEDULE VIII

$1,242,098 times .01 times 2.4 = $31,053 student share;
$1,242,098 times .04 times 2.5 = $124,210 state share;
$1,242,098 times .05 times 2.5 = $155,263 student share;
(Subtotal) ---------- ($186,316) (Student Share

Student employment is customarily coordinated by the financial aids office; however, employers generally receive the value of wages in labor and wages are therefore not grants in aid. Where the university is the employer the funds for Student Assistants are budgeted as expenses for personal services. An exception is the federal share of Work-Study funds which are budgeted under Student Assistance. Seventy-five per cent of the Work-Study fund is expended on campus to do university work, and is therefore a cost of education.

SCHEDULE IX

$2,294,987 times .75 =	$1,721,240	100.00
Instruction	1,598,909	92.39
Organized Research	3,098	.18
Extension	7,746	.45
Summer Session	111,487	7.98

In summary, student financial aids which represent costs of education not accounted for elsewhere:

SCHEDULE X

NDEA Student Loans interest contributed by State ----------	$ 29,849
NDEA Student Loans interest contributed by Federal Government --	268,640
NDEA Student Loans interest paid by Students ----------	47,971
State Student Loans interest contributed by State ----------	124,210
State Student Loans interest paid by Students ----------	186,316
Work-Study wages paid by Federal Government ----------	1,598,909
Total ----------	$2,255,895

The cost of buildings can be the cost of construction amortized over the life expectancy* 39 , the cost of borrowing the depreciated value, the cost of borrowing the insured value* 66, or the cost of borrowing the replacement value. Though difficult to estimate and somewhat inaccurate because substandard space is very seldom replaced by substandard space, the cost of borrowing the replacement value seems to be a more realistic measure than any of the alternatives. The value of academic buildings on the Wisconsin State University campuses was $138,841,122 in 1966-67* 82

Expenditures for non-academic buildings and land are covered by amortization payments included in the auxiliary program operating budget.* 48 The replacement value of land for academic purposes was $1,691,835 in 1966-67. The annual cost of borrowing in 1966-67 averaged 3.4% for a total of $4,778,121 on $138,841,122 for buildings and $1,691,835 for land. The sources of funds for investment in real estate as of October, 1966, was:* 73 & 4

State	$138,781,547	98.75%
Federal	1,611,810	1.15%
Barron County	129,600	.10%
Total	$140,532,957	100.00%

Instruction accounted for 92.39% of the major university functions. The cost of borrowing the instructional share of the value of buildings and land is 92.39% of $4,778,121 or $4,414,506.

The average cost of room and board for commuting students at the Wisconsin State Universities is estimated at $478.*106 Of this 43% or $206 can be construed as the cost of room and 57% or $272 as the cost of board.*101 In 1966-67 54% or 22,394 students did not live in residence halls budgeted for under auxiliary programs and 27% or 11,197 students, it is estimated, did not regularly eat in food service facilities budgeted for under auxiliary programs.*104

22,394 times $206 =	$4,614,164
11,197 times $272 =	$3,045,584
Total	$7,658,748

Miscellaneous student expenditures for recreation, books, supplies, etc. are estimated to average $414 for residents of dormitories and $426 for others.

20,259 times $414 =	$ 8,387,226
21,211 times $426 =	9,035,886
Total	$17,423,112

The average annual income foregone can be estimated as $487 times 1.211 or $590 per student.*114 & 115 41,470 students times $590 = $24,467,300.

In summary, the total 1966-67 academic year cost of education in Wisconsin State Universities is:

SCHEDULE XI

Operating Cost of instruction (Schedule IV)	$ 39,793,148	32.86%
Operating Cost of student aids program (Schedule IV)	765,952	.63%
Student financial aids not otherwise accounted for (Sch. X)	2,255,895	1.87%
Cost of auxiliary programs (Sch. VI)	24,120,669	19.97%
Cost of borrowing the value of academic buildings and land	4,414,506	3.65%
Cost of room & board not covered by the budget for aux. prog.	7,658,748	6.34%
Cost of recreation, books, supplies, etc. not covered by budget for auxiliary programs.	17,423,112	14.42%
Value of average annual income foregone	24,467,300	20.26%
Total	$120,809,330	100.00%

3. Division of the total 1966-67 academic year cost of education in the Wisconsin State Universities (B-2 above) by the full-time equivalent enrollment, 41,470, (Schedule I) results in an annual average academic year cost of $2913 per student. Students typically earn a bachelor's degree in four academic years; $2913 times four = $11,652 the current average cost of a college education.

C. What is the 1966-67 average net cost per student of a college education in the Wisconsin State Universities?

1. The unit is full-time equivalent students (from A-1 above) 41,470.

2. The costs listed in B-2 above include student income foregone which is the net difference between income as a full-time worker less income as a student; however, certain costs for food, housing, and recreation would exist whether the individual were a student or not. Postulating food costs at $250 per academic year, housing at $200 per academic year, and recreation, etc., at $100 per academic year for non-students, the following results are obtained:

SCHEDULE XII

Operating cost of instruction (Schedule XI)	$39,703,148	40.51%
Operating cost of student aids program (Schedule XI)	765,952	.78%
Student financial aids not otherwise accounted for (Sch. XI)	2,255,895	2.30%
Cost of borrowing the value of academic bldgs. & land (Sch. XI)	4,414,506	
Cost of auxiliary program (Sch. XI)	24,120,669	4.50%
Cost of room & board not covered by the budget for aux. prog.(Sch.XI)	7,658,748	
Less 41,470 times $250 (food)	-10,367,500	
Less 41,470 times $200 (housing)	-8,294,000	
	(13,117,917)	(13.39%)
Cost of recreation, books, supplies, etc., not covered by budget for auxiliary programs (Schedule XI)	17,423,112	
Less 41,470 times $100 (recreation)	-4,147,000	
	(13,276,112)	(13.55%)
Value of average annual income foregone (Schedule XI)	24,467,300	24.97%
Net Cost	$98,000,830	100.00%

3. Division of the net 1966-67 academic year cost of education in the Wisconsin State Universities $98,000,830 (C-2 above) by the full-time equivalent enrollment 41,470 (A-1 above) results in a cost of $2363 per student. Students typically earn a bachelor's degree in four academic years. $2363 times four = $9,452 the net cost of a college education. The lifetime earning advantage of college graduates has been variously estimated at from $100,000 to $300,000 over individuals with only school level education. Earnings of the individual may be considered a fair indication of the economic value to society. The following schedule shows rates of return on investment at the various estimates:

SCHEDULE XIII

(1) Net difference in lifetime earnings		(2) Average annual advantage (40)	(3) Investment	(4) Alternate Return (5%)	(5) Net annual advantage (2)-(4)	(6) Annual Rate of return (5) div. by (3)
$100,000 /40	=	$2500	$9,452	$473	$2,027	21.45
136,187 /40	=	3405	9,452	473	2,932	31.02
147,463 /40	=	3687	9,452	473	3,214	34.00
200,000 /40	=	5000	9,452	473	4,527	47.89
250,000 /40	=	6250	9,452	473	5,777	61.12
300,000 /40	=	7500	9,452	473	7,027	84.34

D. What is the 1966-67 average academic year operating cost of instruction per full-time equivalent student, to the state, and to the student?

1. The unit is full-time equivalent students (from A-1 above) 41,470

2. The 1966-67 academic year cost is (Schedule V) :

   a. $44,194,006
   b. $39,703,148
   c. $34,422,400

This cost is borne partially by the students, partially by the state. Student fees were budgeted as the source of $11,065,600 in academic year 1966-67. The balance was budgeted as general purpose revenue from the State of Wisconsin.

SCHEDULE XIV

	Cost	Student Share	%	State Share	%
a.	$44,194,006	$11,065,600	25.04	$33,128,406	74.96
b.	39,703,148	11,065,600	27.87	28,637,548	72.13
c.	34,422,400	11,065,600	32.15	23,356,800	67.85

The typical full-time Wisconsin resident student paid $210 in academic fees for 1966-67.* 101

SCHEDULE XV

	Fees	Average operating cost (A-3 above)	Per Cent
a.	$210	$1066	19.70
b.	210	957	21.94
c.	210	830	25.30

3. Division of the costs (from D-2 above) by the full-time equivalent students yields the 1966-67 average academic year operating cost per student.

SCHEDULE XVI

	Student Share	Divided by	Equals	
a-c	$11,065,600	41,470	$267	Per Student
	State Share			
a.	$33,128,406	41,470	$799	Per Student
b.	28,637,548	41,470	$691	Per Student
c.	23,356,800	41,470	$563	Per Student

E. What is the 1966-67 average cost per student of a college education in the Wisconsin State Universities, to the student, to the state, to the federal government, to donors of private gifts?

1. The unit is full-time equivalent students (from A-1 above) 41,470

2. The total 1966-67 academic year cost of education in the Wisconsin State Universities is $98,000,830 (from B-2 above). That total can be broken down as follows:

SCHEDULE XVII

	Student Share
	$11,065,600 In Fees (Schedule XIV)
Less	-1,371,500 State Scholarships*103
	-182,632 Private Scholarships and Gifts (Schedule XI)
	-479,714 Federal Share of NDEA student loans forgiven (Schedule VII)
	-53,302 State share of NDEA student loans forgiven (Schedule VII)
	234,287 Interest on loans (Schedules VII and VIII)
	20,382,646 Auxiliary programs (Schedule VI)
	7,658,748 For other room and board (Schedule XI)
Less	-18,661,500 Normal (non-school) cost of room and board (Schedule XII)
	17,423,112 For recreation, etc. (Schedule XI)
Less	-4,147,000 Normal (non-school) cost of recreation (Schedule XII)
	24,467,300 Income foregone (Schedule XI)
	$56,336,045 Cost to Students (Subtotal)

	State Share
	$39,703,148 Operating cost of instruction (Schedule IV)
Less	-11,065,600 Fees (from D-3 above)
	765,952 Operating cost of students aid programs (Schedule IV)
	1,371,500 State Scholarships*103
	53,302 State share of NDEA student loans forgiven (Schedule VII)
	29,849 Interest on NDEA students loans contributed by state (Schedule VII)
	2,834,353 Operating cost of education-related auxiliary programs (Schedule VI)
	124,210 State interest on State student loans (Schedule VIII)
	4,359,325 Cost of borrowing the value of academic bldgs. & land (Schedule XI)
	$38,176,039 Cost to State (Subtotal)

Federal Share

$ 479,714	Federal share of NDEA student loans forgiven (Schedule VII)
924,871	Support for instruction (Schedule VI)
268,640	Interest on NDEA student loans contributed by Fed. Govt. (Sch. VII)
1,598,909	Work-Study wages (Schedule X)
50,767	Cost of borrowing the value of academic bldgs. & land (Schedule XI)
$ 3,322,901	Cost to Federal Government (Subtotal)

County Share

$ 4,414	Cost of borrowing the value of land (Schedule XI)
$ 4,414	Cost to County (Subtotal)

Private Share

$ 161,431	Scholarships and gifts (Schedule VI)
$ 161,431	Cost to Private Donors (Subtotal)

$96,617,446 Total

3. Division of total costs by full-time equivalent students results in the following:

SCHEDULE XVIII

		%		
Cost to Student	$56,336,045	57.49	/41,470 =	$1358 Per Student
Cost to State	38,176,039	38.95	/41,470 =	921 Per Student
Cost to Federal Government	3,322,901	3.39	/41,470 =	80 Per Student
Cost to Barron County	4,414	.01	/41,470 =	-- Per Student
Cost to Private Donors	161,431	.16	/41,470 =	4 Per Student
Total	$98,000,830	100.00		$2363 Per Student

In four years the costs mount to:

Cost to Student	$1358	times four =	$5432 Per Student
Cost to State	921	times four =	3684 Per Student
Cost to Federal Government	80	times four =	320 Per Student
Cost to Private Donors	4	times four =	16 Per Student
Total	$2363	times four =	$9452 Per Student

F. What is the average academic year cost of education per full-time equivalent student enrolled in the Wisconsin State Universities in 1966-67 by lower, upper, and graduate division level?

In building a budget for the Wisconsin State Universities the State of Wisconsin applies the techniques described in A-2-c above. Commencing with the 1967-69 biennium budgets for increased workload-enrollment will be based on costs per student by level.* 58 & 51 The most recent Direct Cost of Instruction Study*108 & 98 1964-65 (another Cost of Instruction Study is scheduled for Fall 1967-68) revealed the following relationships:

	Ratio
Lower Division (Freshmen & Sophomores & Specials) 88.55% of the mean	1.00
Upper Division (Juniors & Seniors) 122.17% of the mean	1.38
Graduate Division (Masters & Specialists) 186.14% of the mean	2.10

Applying these ratios to the average cost per student (Schedule V) results in the following:

SCHEDULE XIX

Cost Per Student	(a)	(b)	(c)	Ratio
Average Cost	$1066	$ 957	$ 830	1.13
Lower Div. 88.55	944	847	735	1.00
Upper Div. 122.17	1302	1169	1014	1.38
Grad. Div. 186.14	1984	1781	1545	2.10

The validity of the above results is open to question because the ratios are those which existed two years prior to the period under study. The degree of error present can be estimated by checking the following results against the actual budget:

SCHEDULE XX

	Enrollment	(a)		(b)		(c)	
	*103 & *108	Rate	Amount	Rate	Amount	Rate	Amount
Lower Division	28,753	$ 944	$27,142,832	$ 847	$24,353,791	$ 735	$21,133,455
Upper Division	11,976	1302	15,592,752	1169	13,999,944	1014	12,143,664
Graduate Div.	741	1984	1,470,144	1781	1,319,721	1545	1,144,845
Subtotal			$44,205,728		$39,673,456		$34,421,964
Total	41,470	$1066	$44,194,006		$39,703,148		$34,422,964
Difference			-$11,722		+$29,692		+$436
Degree of Error			-.026%		+.074%		+.001%

If the average annual cost of education is $2363 (Schedule XVIII), the cost of instruction is $957 (Schedule V-b), and it is postulated that the non-instructional costs are approximately equal on all levels and is $2363-$957 = $1406, then the average annual costs by level would be as follows:

SCHEDULE XXI

	Instruction		Non-Instruction		Annual
Average	$ 957	+	$1406	=	$2363
Lower Division	847	+	1406	=	2253
Upper Division	1169	+	1406	=	2575
Graduate Division	1781	+	1406	=	3187

G. What is the mean 1966-67 cost per credit in the Wisconsin State Universities?

1. The unit is equivalent semester credits, i.e., three quarter credits equal one semester credit.* 41 The total equivalent semester credit enrollment in 1966-67 is 1,236,384.* 104

2. The cost can be cost of instruction $39,703,148 (Schedule IV) or cost of education $98,000,830 (Schedule XVIII).

3. The mean cost per credit = $\frac{\text{Cost}}{\text{No. Credits}}$

39,703,148 / 1,236,384 = $32.11 Instruction
98,000,830 / 1,236,384 = $79.26 Total Education
Difference $47.15

Applying the ratios derived from the 1964-65 Direct Cost of Instruction Study*98 results in the following costs per credit by level (Sch. XIX)

SCHEDULE XXII

	%	Instruction	Other	Total
Average	100.00	$32.11	+ 47.15 =	$ 79.26
Lower Division	88.55	28.43	+ 47.15 =	75.58
Upper Division	122.17	39.23	+ 47.15 =	86.38
Graduate Division	186.14	59.76	+ 47.15 =	106.91

H. What are the costs of different major programs in the Wisconsin State Universities?

1. The 1964-65 Direct Cost of Instruction Study*98 revealed the following relative costs per credit by discipline as a percentage of the mean:

SCHEDULE XXIII
(All Levels)

	%		%		%
Accounting	99	Electronics & Mechanics	167	Mathematics	73
Agriculture	170	English	88	Metals	222
Art	114	Food & Nutrition	134	Music	206
Biology	99	Foreign Language	136	Philosophy	98
Business	85	Geography	75	Physical Educ.	120
Business Educa.	199	Geology	110	Physics	130
Chemistry	124	History	79	Political Sci.	70
Civil Engineer.	163	Home Economics	78	Printing	258
Clothing & Tex.	105	Industrial Arts	152	Psychology	70
Conservation	78	Industrial Graphics	123	Sociology	63
Economics	75	Journalism	228	Speech	115
Education	155	Library Science	225	Wood Technics	248

SCHEDULE XXIV
(Lower Division)

	%		%		%
Accounting	115	Electronics & Mechanics	156	Mathematics	120
Agriculture	194	English	104	Metals	210
Art	125	Food & Nutrition	113	Music	218
Biology	100	Foreign Languages	138	Philosophy	112
Business	74	Geography	78	Physical Educ.	129
Business Educa.	156	Geology	104	Physics	128
Chemistry	125	History	59	Political Sci.	59
Civil Engineer.	140	Home Economics	107	Printing	230
Clothing & Tex.	111	Industrial Arts	184	Psychology	66
Conservation	60	Industrial Graphics	118	Sociology	63
Economics	77	Journalism	173	Speech	111
Education	106	Library Science	309	Wood Technics	236

SCHEDULE XXV
(Upper Division)

	%		%		%
Accounting	79	Electronics & Mechanics	137	Mathematics	73
Agriculture	141	English	77	Metals	213
Art	99	Food & Nutrition	163	Music	195
Biology	111	Foreign Language	140	Philosophy	80
Business	73	Geography	80	Physical Educ.	108
Business Educa.	87	Geology	133	Physics	126
Chemistry	148	History	80	Political Sci.	86
Civil Engineer.	142	Home Economics	114	Printing	361
Clothing & Tex.	139	Industrial Arts	115	Psychology	72
Conservation	100	Industrial Graphics	171	Sociology	68
Economics	69	Journalism	233	Speech	127
Education	133	Library Science	167	Wood Technics	252

2. The typical cost per student of a major program in sociology may be derived as follows:

SCHEDULE XXVI

	Instruction	Other	Total
Lower Division (Schedule XXI)			
Freshman Year	$847	+ $1406	= $2253
Sophomore Year	$847	+ $1406	= $2253
Upper Division (Schedules XXV, XXI, & XXII)			
36 Credits in Sociology*107			
@ 68% of 39.23 =	$960	+ $1406	= $2366
28 Other Credits			
@ 100% of 39.23 =	$1098	+ $1406	= $2504
Total Cost	$37.52	+ $5624	= $9376

3. The typical cost per student of a major program in Industrial Technology with emphasis in Printing may be derived as follows:

SCHEDULE XXVII

		Instruction		Other		Total
Lower Division (Schedules XXI, XXIV & XXII)* 86						
Freshman Year						
6 Credits in English @ 104% of $28.43	=	$177				$177
3 Credits in Education @ 106% of $28.43	=	90				90
2 Credits in Drafting @ 118% of $28.43	=	67				67
2 Credits in Metalworking @ 210% of $28.43	=	119				119
2 Credits in Woodworking @ 236% of $28.43	=	134				134
2 Credits in Printing @ 230% of $28.43	=	131				131
8 Credits in Mathematics @ 120% of $28.43	=	273				273
3 Credits in Physical Educ. @ 129% of $28.43	=	110				110
3 Credits in Sociology @ 63% of $28.43	=	54				54
2 Credits in Speech @ 111% of $28.43	=	63 ($1218)	+	$1406 ($1406)	=	$1469 ($2624)
Sophomore Year						
2 Credits in Design @ 118% of $28.43	=	$ 67				$ 67
2 Credits in Mechancis @ 156% fo $28.43	=	89				89
2 Credits in Plastics @ 184% of $28.43		105				105
2 Credits in Electricity @ 156% of $28.43	=	89				89
2 Credits in Industrial Organz. @ 184% of $28.43	=	105				105
8 Credits in Mathematics @ 120% of $28.43		273				273
5 Credits in Chemistry @ 125% of $28.43	=	178				178
3 Credits in Economics @ 77% of $28.43	=	66				66
2 Credits in Speech @ 111% of $28.43	=	63				63
4 Credits in History @ 59% of $28.43	=	67 ($1102)	+	$1406 ($1406)	=	1473 ($2508)

Upper Division

		Instruction		Other	Total
Junior Year					
3 Credits in English @ 77% of $39.23	=	$ 91			$ 91
5 Credits of Ind. Educ. @ 115% of $39.23	=	226			226
4 Credits in Chemistry @ 148% of $39.23	=	232			232
8 Credits in Physics @ 126% of $39.23	=	395			395
6 Credits in Liberal Stud. @ 100% of $39.23	=	235			235
7 Credits in Pringing @ 361% of $39.23	=	991 ($2170)	+	$1406 ($1406)	= 2379 ($3576)
Senior Year					
2 Credits in Education @ 133% of $39.23	=	$104			$104
4 Credits in Ind. Educ. @ 115% of $39.23	=	180			180
3 Credits in Physics @ 126% of $39.23	=	148			148
2 Credits in Economics @ 69% of $39.23	=	54			54
3 Credits in History @ 80% of $39.23	=	94			94
5 Credits in Liberal Stud. @ 100% of $39.23		196			196
15 Credits in Printing @ 361% of $39.23	=	2124 ($2900)	+	$1406 ($1406)	= 3530 ($4306)
Total Cost		$7390	+	$5624	= $13,014

For a guide to a more detailed method of calculating the cost of majors and minors see Swanson et. al. *88

I. Is there any evidence of "economy of scale" within the Wisconsin State University system? Are costs lower in larger institutions?

1. The enrollments at the Wisconsin State Universities in the fall of 1966-67 were:*104

Oshkosh	8267
Whitewater	7004
Eau Claire	5326
Stevens Point	5123
La Crosse	4514
Platteville	4190
River Falls	3544
Stout	3251
Superior	2709

2. The 1964-65 Direct Cost of Instruction Study*98 reveals the following relationships:

SCHEDULE XXVIII

	Enrollment as a Percentage of the Mean (a)	Percentage of Mean Cost Per Credit Lower Division (b)	Upper Division (c)	Total (d)
Oshkosh	168.92	96.33	83.02	90.52
Whitewater	143.11	97.61	90.24	93.36
Eau Claire	108.83	100.26	106.47	101.60
Stevens Point	104.68	103.50	105.72	103.72
La Crosse	92.26	93.11	101.68	94.24
Platteville	85.62	96.84	96.71	96.77
River Falls	72.42	117.51	123.92	120.86
Stout	66.43	109.74	111.67	113.13
Superior	55.35	107.94	104.39	107.66

Correlations: (a) (b) .9021
(a) (c) .9468
(a) (d) .9333

3. Generally, the two largest universities have the lowest costs per credit while the three smallest universities have the highest costs per credit. Apparently, there is economy in large scale. The highest cost per credit is 24.86%, 49.27%, and 33.52% higher than the lowest cost per credit at the lower division level, the upper division level, and for the institution as a whole, respectively.

J. Are the curriculums at the "high cost" universities significantly more valuable than those at the "low cost" universities?

It has been claimed that high cost curriculums are more valuable to society than low cost curriculums and that, where curriculums are the same, the graduates of small colleges and universities are better educated than the graduates of large colleges and universities. One reliable guide to the value of a curriculum and a university is the level of first year salaries of graduates. The 1966 Placement Report*105 reveals the following relationships among the universities:

SCHEDULE XXIX

	Mean Cost Per Credit as a Percentage of the Systemwide Mean	Mean Starting Salary of Graduates, as a Percentage of the Systemwide Mean
Oshkosh	90.52	97.12
Whitewater	93.36	98.02
La Crosse	94.24	85.05
Platteville	96.77	109.37
Eau Claire	101.60	103.42
Stevens Point	103.72	97.84
Superior	107.66	94.77
Stout	113.13	104.14
River Falls	120.86	105.23

Correlation .0592

Neither the highest nor the lowest average salaries were offered to the two largest or the three smallest universities. The correlation between cost per credit and salary of graduates is low. Apparently, those who hire university graduates do not see a relationship between the size of the university nor the cost per credit and the quality of the graduates. If they do see such relationships, employers apparently do not act on them.

K. Are faculty salaries higher at the "high cost" universities than at the "low cost" universities?

1. In 1954 the California and Western Conference . . . study concluded that there is not a fixed relationship between the cost per credit and the average faculty salary of a college or university.*60 Inasmuch as the largest Wisconsin State University ten years ago (La Crosse: 1497) was only about half the size of the smallest university today (Superior: 2709), the range in size was much smaller then than it is now (1956: 938-1497) (1966: 2709-8267),*99 and the rate of faculty growth has a strong effect on average faculty salary (the longer the average tenure, the higher the salary), it could be expected that the largest universities pay lower average salaries than the smallest universities.

2. The Schedule of Faculty Salary Averages . . . 1966-67*40 & 100 reveals the following:

SCHEDULE XXX

	Mean Cost Per Credit as a Percentage of the Systemwide Mean	Mean Academic Salary as a Percentage of the Systemwide Mean
Oshkosh	90.52	99.18
Whitewater	93.36	99.42
La Crosse	94.24	100.67
Platteville	96.77	101.39
Eau Claire	101.60	100.67
Stevens Point	103.72	96.48
Superior	107.66	101.94
Stout	113.13	101.46
River Falls	120.86	101.04

Correlation .0623

3. The highest mean salary is only 5.66% higher than the lowest mean salary. The highest mean salary is in the highest cost group but the lowest mean salary does not fall in the lowest cost group. The correlation between academic salary and cost per credit is not high.

The California and Western Conference, Swanson et. al.,*88 Ruml*75 and others have suggested that the key to cost reduction is the number of sections (per thousand students) offered. Data on sections is not available as of this writing; however, the matter should be pursued . . .

L. Do the teaching faculty members at "high cost" universities work harder, i.e., generate more class contact periods per week, than the faculty members at "low cost" universities as suggested by the California and Western Conference . . . Study*60 and others?

1. Inasmuch as the great majority of sections are taught by one faculty member each, the number of faculty contact periods per teaching faculty member is a close approximation of the number of sections per faculty member. The . . . Faculty . . .List 1966-67*100 and a Faculty Contact Period per week*81 report reveal the following:*22

SCHUDULE XXXI

	Cost Per Credit as a Percentage of the Systemwide Mean	Faculty Contact Periods Per Week as a Percentage of the Systemwide Mean
Oshkosh	90.52	80.56
Whitewater	93.36	91.12
La Crosse	94.24	89.45
Platteville	96.77	112.23
Eau Claire	101.60	123.20
Stevens Point	103.72	120.69
Superior	107.66	103.97
Stout	113.13	110.24
River Falls	120.86	97.07

Correlation .5590

The three low cost universities had the fewest weekly faculty contact periods (sections) per faculty member. We can say that the teaching faculty at the low cost universities do not "work" as hard as those at the other universities if faculty contact periods per week (sections) are an indication of "work". The faculty with the heaviest average load teaches 52.93% more periods per week than the faculty with the lowest average load! Perhaps the California and Western Conference Study . . .*60 is right, the key to reducing costs may be the reduction in the numbers of sections. The matter deserves more study.

M. Do the "high cost" universities have a higher percentage of doctoral degree holders on their staffs than the "low cost" universities?

SCHEDULE XXXII

	Cost per Credit as a Percentage of the Systemwide Mean	Doctoral Degree Holders as a Percentage of the Systemwide Mean
Oshkosh	90.52	104.74
Whitewater	93.36	85.46
La Crosse	94.24	85.59
Platteville	96.77	91.33
Eau Claire	101.60	105.62
Stevens Point	103.72	104.06
Superior	107.66	103.80
Stout	113.13	81.79
River Falls	120.86	112.01

Correlation .2399

The above information based on the . . . Faculty . . . List 1966-67*100 and unpublished data on file in the Board of Regents office*22 reveals a low correlation between the percentage of the faculty holding the doctoral degree and the cost per credit.

N. Are the graduates of universities with a high level of doctoral degree holders offered better starting salaries than the graduates of universities with low doctoral degree ratios?

Although this question has little directly to do with unit costs, it is interesting because of the claims of quality associated with the doctoral degree.

SCHEDULE XXXIII

	Mean Starting Salaries of Graduates as a Percentage of the Systemwide Mean	Doctoral Degree Holders as a Percentage of the Systemwide Mean
La Crosse	85.05	85.59
Superior	94.77	103.80
Oshkosh	97.12	104.74
Stevens Point	97.84	104.06
Whitewater	98.02	85.46
Eau Claire	103.42	105.62
Stout	104.14	81.79
River Falls	105.23	112.01
Platteville	109.37	91.33

Correlation .2290

The market does not consider the graduates of universities with high doctoral degree ratios more valuable (better educated?) than the graduates of universities with low doctoral degree ratios!

O. What is the cost per weekly student contact period at the Wisconsin State Universities, 1966-67?

1. The unit is weekly student contact period (hour).*41 The number of contact periods generated per week average 716,309 in the fall of 1966.*81

2. Costs are cost of instruction (Schedule V-b) $49,703,148 and total cost (Schedule XII) $89,000,830.

3. $39,703,148 / 716,309 = $55.43 per weekly student contact period for instruction.
$89,000,830 / 716,309 = $124.25 per weekly student contact period, total cost.

4. The cost per single student contact period equals 716,309 times 36 weeks in the year divided into $39,703,148 and $89,000,830 respectively.

$39,703,149 / 25,787,124 = $1.54 per contact period, instruction;
$89,000,830 / 25,787,124 = $3.45 per contact period, total cost.

P. The foregoing calculations have been based on estimated and budgeted data. The estimates can and should be refined, especially those having to do with student finances. Operations should be financially analyzed along the lines indicated by Hirschl*42 and Swanson et. al.,*24. The studies should be replicated on the basis of actual expenditure vs. budget. Finally, the studies should be repeated over a series of years to show trends.

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